



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

11.2

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,038	07/21/2003	Young-Kai Chen	28-19-3-3	6373

7590 05/23/2007  
Docket Administrator (Room 3J-219)  
Lucent Technologies Inc.  
101 Crawfords Corner Road  
Holmdel, NJ 07733-3030

EXAMINER
----------

RICHARDS, N DREW

ART UNIT	PAPER NUMBER
----------	--------------

2815

MAIL DATE	DELIVERY MODE
-----------	---------------

05/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/624,038	Applicant(s) CHEN ET AL.	
	Examiner N. Drew Richards	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 January 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8,10,12-14,16-19,22,25 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8,10,12-14,16-19,22,25 and 29-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 8, 10, 12-14, 16, 22 and 25 are rejected under 35 USC § 102(b) as being anticipated by Imai (US 5,506,427).

Regarding claim 8, Imai illustrates in figures 1(A)-4 (entire document), particularly figure 1(H), an integrated circuit comprising:

a substrate 10/12/18 having a top surface;

collector 14, base 30a/32/36, and emitter 38/40 semiconductor layers of a bipolar transistor, the semiconductor layers forming a vertical sequence on the substrate in which intrinsic portions of two of the semiconductor layers (14 and 36) are sandwiched between the top surface of the substrate 10 and a remaining top one 38/40 of the semiconductor layers,

the base layer comprising an extrinsic portion 30a/32 that laterally encircles a vertical portion of the top one of said semiconductor layers 38; and

a dielectric sidewall 34 being interposed between the vertical portion of the top one 38 of the layers and the extrinsic portion of the base layer 32; and

Art Unit: 2815

wherein the substrate 10/12 includes a subcollector 18 that forms an electrical contact for the collector layer 14, the entire subcollector being located outside of the portion of the substrate that is vertically below part of the base layer.

Regarding claims 10 and 14, Imai illustrates in fig. 1(H) that the extension of the base layer 32 extends farther away from the substrate 10 than an interface between the top layer 38 and the base layer 36.

Regarding claim 12, Imai illustrates in fig. 1(H) the part of the extension of the base layer 32 is located between the substrate 10 and an extrinsic portion 40 of the top one of the semiconductor layers.

Regarding claims 13 and 25, Imai illustrates in fig. 1(H) comprising a dielectric layer 26 (labeled in figure 1B), a portion of the dielectric layer being located on the extrinsic portion of the base layer 30a/32 and the extrinsic portion 40 of the top one 40 of the semiconductor layers being located on the dielectric layer.

With regards to claim 16, Imai discloses in col. 4, lines 14-16, the top one 38 of the collector, base, and emitter semiconductor layers is epitaxially grown.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 17 is rejected under 35 USC § 103 (a) as being unpatentable over Imai as applied to claim 8 above, and further in view of U.S. Patent No. 5,444,003 to Wang et al. ("Wang").

With regard to claim 17, Imai is discussed above, it does not show the top one of the semiconductor layers, the emitter, is a graded layer. Wang illustrates in figures 3A and 3B and discloses in col. 7, lines 36-62, the top one of the semiconductor layers, the emitter 22, is a graded layer. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a graded emitter layer for a "top-down" process that is highly compatible (Wang col. 3, lines 24-32).

5. Claims 18, 19, 29 and 30 are rejected under 35 USC § 103 (a) as being unpatentable over Imai as applied to claim 8 above, and further in view of Malik (US 6,541,346 B2).

Imai is discussed above, it does not show the top one of the semiconductor layers, the emitter, includes gallium or an InP layer or that the base layer comprises gallium or gallium, indium and arsenic. Malik discloses in col. 2, lines 23-31, that typical materials for HBT's include forming the emitter (top one of the semiconductor layers) of AlGaAs or InP and forming the base of InGaAs. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a top AlGaAs or InP emitter layer and a base of InGaAs to reduce the injection of majority carriers from base to emitter to allow improvements in the high-frequency performance of the transistor (Malik col. 2, lines 31-43).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imai with Malik as applied to claims 18, 19, 29 and 30 above, and further in view of Konig et al. (US 5,096,844).

Imai with Malik do not teach the substrate being an InP substrate. Malik teach the advantageous use of an InP/InGaAs HBT where the emitter is InP and the base is InGaAs. However, Malik does not explicitly disclose what materials the collector and substrate are in the InP/InGaAs HBT. Nonetheless, forming the collector of InP in an InP/InGaAs HBT would be implicitly understood by one of ordinary skill in the art at the time of the invention. Konig et al. teach on column 4 lines 25-28 that it was known at the time of the invention to form the collector of InP when forming a InP/InGaAs HBT. Thus, Konig et al. provides evidence that one of ordinary skill in the art would recognize that the InP/InGaAs HBT of Malik is known to include an InP collector. Konig et al. further teach that when forming a HBT using an InP collector, the substrate should be

Art Unit: 2815

InP. The motivation for choosing InP as the substrate is to provide lattice matching with the collector layer (Konig et al. column 2 lines 40-43). Thus, at the time of the invention it would have been obvious to one of ordinary skill in the art to employ an InP substrate as taught by Konig et al. into the device of Imai and Malik.

### ***Response to Arguments***

7. Applicant's arguments filed 1/8/07 have been fully considered but they are not persuasive.

Applicant has argued that Imai does not disclose a subcollector as claimed since layer 12 of Imai is not formed such that the entire layer 12 is not located in the portion of the substrate vertically below part of the base layer. This is not persuasive. In the rejection above, layer 12 is not relied upon for teaching the claimed subcollector. Instead, layer 18 is relied upon for teaching the claimed subcollector. Layer 18 is properly interpreted as the subcollector as it forms an electrical contact for the collector layer as claimed and also the entire area of layer 18 is located outside of the portion of the substrate vertically below the base layer as claimed. Thus layer 18 is properly considered the subcollector. As such, applicant's arguments are not persuasive.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2815

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
N. DREW RICHARDS  
PRIMARY EXAMINER